C. MARK EAKIN, PH.D.

2021 FINALIST
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Led the development of a satellite-based monitoring system that provides accurate forecasts and early warnings to environmental officials worldwide at a time when rising ocean temperatures threaten the health of coral reefs.

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Warming oceans not only spawn violent storms, but they harm and sometimes kill coral reefs, the underwater ecosystems that protect shorelines and provide habitats for numerous marine organisms.

When waters surrounding the reefs get too warm, corals—the invertebrates that build the reefs—expel the algae that provide their food and color, exposing their white skeletons. Known as bleaching, this can cause corals to die and reefs to erode, threatening fisheries, tourism and coastal protection.

Mark Eakin, a long-time oceanographer with the National Oceanic and Atmospheric Administration, has led efforts to save coral reefs by leading the development and operation of both climate models and satellite-temperature maps with higher spatial resolution that provide early warnings and forecasts to alert reef managers around the world about bleaching threats.

“It would be difficult to overstate the importance of Mark Eakin’s work when it comes to coral reef conservation,” said Menghua Wang, chief of NOAA’s marine ecosystems and climate branch. “He developed a warning system that predicts and monitors, in near real-time, climate-driven heat stress that drives coral bleaching events across the globe, and that has accurately predicted every major mass bleaching event since 1997.”

The first known global mass bleaching event occurred in the late 1990s and was followed by a series of other such major events over the decades.

The system developed by Eakin and the NOAA Coral Reef Watch team uses satellite data and climate forecasts to show when sea temperatures will warm for a long enough period of time to trigger bleaching—providing resource managers and policymakers with the opportunity to develop coral bleaching response plans to minimize the impact on corals and the entire marine ecosystem.

HONOREE DETAILS

C. Mark Eakin, Ph.D.

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Eakin, who recently retired and is currently serving as a NOAA consultant, has worked with nations big and small, from Australia to island states in the Caribbean and the Pacific Ocean, to understand their concerns and provide the information they need.

“Previously, resource managers would get reports, but there wasn’t a lot they could do,” Eakin said. “Now, thanks to the Coral Reef Watch system, users have better information and more lead time to take action.”

For example, based on the watch system’s forecasts, the government of Thailand shut down its coral reefs to tourists and divers to avoid further stress during a 2015 bleaching event.

Hawaiian officials were so alarmed by a long-range forecast that they brought some of the rarest corals inland. One of those species became extinct in the wild during the 2015 bleaching event. However, that coral and others were grown in nurseries, enabling scientists to reintroduce them onto their home reef in 2019.

The Coral Reef Watch system’s tools not only helped save that species, but also made possible the most rapid known “re-wilding” of any species, Wang said.

In 2016, during the worst coral bleaching event ever at Australia’s Great Barrier Reef, the NOAA system was “critically important in monitoring sea surface temperature and assessing bleaching risk,” said David Wachenfeld, director of reef recovery at the Great Barrier Reef Marine Park Authority in Australia.

Paul DiGiacomo, chief of NOAA’s center for satellite applications and research, said Eakin has combined “tremendous scientific expertise” with an ability to explain complex scientific processes to the public and government officials in language they understand.

Eakin also served as chief science advisor for the documentary “Chasing Coral” that, for the first time, captured bleaching on film as it happened, setting up time-lapse cameras underwater off the coasts of Caribbean islands, Hawaii and Australia to record the day-to-day changes on the ocean floor and the loss of marine species as the coral eroded. The film won the Best U.S. Documentary Audience Award at the 2017 Sundance Film Festival and the 2018 Emmy for Best Nature Documentary.

Eakin retired in December 2020 after 28 years with NOAA, but DiGiacomo said his legacy of protecting coral reefs is clear. “That’s one of the highest services a public servant can provide,” DiGiacomo said.

Eakin said the warning system is not just about predicting bleaching events months in advance, “it’s having an impact on our conversation about climate change.”

“Working with conservation organizations to better protect coral reefs and provide the information that allows them to take action is huge,” he said.

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